



***Stratford on Avon District Council
Annual Status Report 2019***

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2019 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the
Environment Act 1995
Local Air Quality Management

June 2019

Stratford on Avon District Council

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Executive Summary: Air Quality in Our Area

Air Quality in Stratford on Avon

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas^{1,2}.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³.

In 2018, there were no exceedances of the annual mean NO₂ AQS objective recorded by any of the monitoring site currently in operation. There were two diffusion tube locations (Studley 4 and Birmingham Road 3) where the annual mean NO₂ concentration was within 10% of the objective. Studley 4 is located within the current Studley AQMA at a location of relevant exposure and this site has recorded an exceedance, or close to an exceedance, of the annual mean NO₂ AQS objective for the past 5 years. Birmingham Road 3, located within the Stratford-upon-Avon AQMA was commissioned in 2018 and is not at a location representative of relevant exposure, following distance correction, the annual mean NO₂ concentration at the nearest relevant exposure was 27.8µg/m³.

There is no clear trend in NO₂ concentrations when 2018 concentrations are compared with 2017 concentrations. Decreases in annual mean concentrations were recorded Greehill Street and Studley 4, whilst increases were recorded at Guild Street, Wood Street and Henley High Street. The difference of concentrations between 2017 and 2018 concentrations ranged between a maximum increase of 4.1µg/m³ recorded at Henley High Street, and a maximum reduction of 2.3µg/m³ recorded at Studley 4.

As there have been no exceedances of annual mean NO₂ AQS objective in Stratford upon Avon AQMA in the last five years. The Council will consider revoking the AQMA as it has been recommended by Defra

¹ Environmental equity, air quality, socioeconomic status and respiratory health, 2010

² Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

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In 2018, a dispersion modelling assessment was undertaken for the designated Studley AQMA. Modelled results show that there were no exceedances of annual mean concentrations at locations of relevant exposure, but there was one location where the annual mean concentration was within 10% of the annual mean objective. Source apportionment results suggest that Local Road Sources has the largest contribution to NO_x concentrations at 65%. When considering the average NO_x concentration at receptors within the AQMA, cars account for the most NO_x contributions when compared to all vehicle types, followed by HGVs. Based on source apportionment results, any future intervention measures should be targeted at reducing vehicle emissions from cars and HGVs, which have been shown to be the largest contributors to total vehicle emissions within the AQMA.

Actions to Improve Air Quality

The Council is currently updating the Air Quality Action Plan (AQAP) for the Studley AQMA with an air quality steering group set up in 2018 to oversee the development and implementation. The meetings include representatives from the planning, public health, and transport to ensure that all relevant parties within the Council have an input into the AQAP.

The Council is currently a member of the Coventry and Warwickshire Air Quality Alliance (AQA), which was established in December 2015 to take collaborative and collective action against poor air quality. Officers from Environmental Health, Transport, Planning and Public Health departments meet with representatives from Public Health England to work towards the development of a shared document repository and forum for exchange of information and ideas. The Alliance's work programme includes joint support for Active Travel/Healthy Travel Choice campaigns linked with national initiatives; joint work on transport projects (e.g. cycle network bids) and the sharing of planning guidance related to Air Quality. The aim is to create a common approach to planning across Coventry and Warwickshire.

Stratford on Avon District Council have developed a new Air Quality and Planning Guidance that is applicable to development within the District. Developers are required to put in place measures to minimise emissions from the development and, where necessary, offset the impact on the environment. During 2018, Stratford have been working with developers through the planning regime to promote the inclusion of electric charging points for electric/hybrid vehicles at new development sites.

Conclusions and Priorities

The priorities for the Council in addressing the air quality in the coming year include:

- Updating the AQAP based on the dispersion modelling that has been undertaken for the Studley AQMA;
- Continue to monitor NO₂ within the current AQMAs, so any future changes in NO₂ concentration can be observed; and
- Work together with developers to improve sustainable transport links serving new developments and promote the inclusion of electric charging points for electric/hybrid vehicles at new development sites.

Local Engagement and How to get Involved

As the main source of air pollution within Stratford arises from transport sources, a way for the public to get involved with helping improving air quality within the area would be to look at alternatives to the way they travel.

The following are suggested alternatives to private travel that would help contribute to improving the air quality within Stratford:

- Public transport – The use of the bus and train facilities, which in turn reduces pollutant concentration by reducing the number of vehicles on the road, this also helps to reduce congestion;
- Walk or cycle if your journey allows – From choosing to walk or cycle for your journey the number of vehicles is reduced and also there is the added benefit of keeping fit and healthy;
- Car/lift sharing – Where a number of individuals are making similar journeys, such as travelling to work or to school car sharing reduces the number of vehicles on the road and therefore the amount of emissions being released. This can be promoted via travel plans through the workplace and also within schools; and
- Alternative fuel / more efficient vehicles – Choosing a vehicle that meets the specific needs of the owner, fully electric, hybrid fuel and more fuel efficient cars are available and all have different levels benefits by reducing the amount of emissions being released.

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1 Local Air Quality Management

This report provides an overview of air quality in Stratford on Avon District Council during 2018. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Stratford on Avon District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMA) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMA declared by Stratford on Avon District Council can be found in Table 2.1. Further information related to declared or revoked AQMA, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=263.

Alternatively, see Appendix D: Maps of Monitoring Locations and AQMA, which provides for a map of air quality monitoring locations in relation to the AQMA.

In 2018, a dispersion modelling assessment was undertaken for Studley AQMA. Modelled results show that there are exceedances of annual mean NO₂ AQS objective at generic receptor locations within a grid of spatial resolution of approximately 1.9m x 3.7m across a regular gridded area within the AQMA, however, no exceedances of annual mean concentrations were predicted at relevant receptor locations. In addition there was only one location where the annual mean concentration was within 10% of the objective.

As there have been no exceedances of annual mean NO₂ AQS objective in Stratford upon Avon AQMA in the last five years, the Council will consider revoking the AQMA.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
Studley AQMA	Declared 23 rd February 2006	NO ₂ Annual Mean	Studley	A number of properties along a 200m stretch of Alcester Road from the junction with High Street.	NO	62	µg/m ³	38.0	µg/m ³	Action Plan	2008	Draft Air Quality Action Plan for Alcester Road Studley https://www.stratford.gov.uk/environment/air-quality-management.t.cfm
AQMA Stratford Upon Avon	Declared 21 st January 2010	NO ₂ Annual Mean	Stratford on Avon	An area encompassing most developed areas of Stratford Upon Avon and Tiddington.	NO	45	µg/m ³	33.7	µg/m ³	None	-	-

Stratford on Avon District Council confirm the information on UK-Air regarding their AQMA(s) is up to date

2.2 Progress and Impact of Measures to address Air Quality in Stratford on Avon District Council

Defra's appraisal of last year's ASR concluded

1. The Council should undertake their statutory obligations for public consultation of their draft Studley AQAP once it has been developed. It is recommended that the AQAP also be appraised by DEFRA prior to publication. For further guidance please refer to LAQM Technical Guidance 2016 (TG16).
2. The current Studley AQAP lacks sufficient detail. The new AQAP, under development, should include direct measures (where possible, e.g. traffic management measures), specific dates for planning-completion, and objective KPIs and reduction targets. This will help the Council to chart their progress. For further guidance please refer to TG16.
3. It is recommended that the Stratford upon Avon AQMA be revoked as soon as possible. All monitoring sites indicate that concentrations are far below objective levels and have been for the past five years.
4. Further to the above, it is recommended that the Council review and update their monitoring strategy. The Council have a number of sites that have continually recorded low concentrations. These resources could be redeployed elsewhere in the District to identify new hotspots. For further guidance please refer to TG16.

The draft AQAP for Studley is currently being updated, the update is to be informed by the detailed modelling assessment that has been completed. Public consultation will be undertaken once it has been developed. The measures to be developed within the new AQAP will take on board the feedback provided by Defra in regards to including specific dates for planning-completion, objective KPIs and reduction targets in order to evaluate the ongoing progress of the AQAP.

Due to continual compliance with the annual mean NO₂ AQS objective by all monitoring within the Stratford-upon-Avon AQMA, the Council will consider revoking the AQMA within 2019.

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The current monitoring network was reviewed during 2018 with an additional nine NO₂ diffusion tubes being deployed, and in addition one diffusion tube at the Shipston Road being relocated from (420683, 254421) to Shipston Road New (420691, 254679).

Stratford on Avon District Council has taken forward a number of direct measures during the current reporting year of 2019 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

Stratford on Avon District Council anticipates that further additional measures to be developed as part of the updated AQAP, and to be included in subsequent years reporting to achieve compliance and enable the revocation of Studley AQMA.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Developer Requirements SPD, including Air Quality	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Stratford on Avon District Council	Complete	In progress	N/A	N/A	Air quality chapter due to be adopted	Jul-19	None identified
2	Member of Coventry and Warwickshire Air Quality Alliance	Policy Guidance and Development Control	Regional Groups Coordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	Warwickshire County Council Public Health	Complete	On going	N/A	N/A	Implementation on-going	Stratford on Avon DCAir Quality and Planning Guidance completed	None identified
3	Stratford DC Air Quality and Planning Guidance	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Stratford on Avon District Council in partnership with Works AQ Alliance	Complete	In progress	N/A	N/A	Completed and published	-	-

2.3 PM_{2.5} – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of PM_{2.5} (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM_{2.5} has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Currently there is no monitoring of PM_{2.5} or PM₁₀ completed within Stratford on Avon District Council, therefore no concentration values can be reported or estimated using the method as described in Box 7.7 of LAQM.TG(16).

The current Defra background maps for Stratford (2017 based⁴) show that all background concentrations of PM_{2.5} are far below the 2020 annual mean AQS objective for PM_{2.5}. The highest concentration is predicted to be 11.2µg/m³ within the 1 x 1km grid square with the centroid grid reference of (435500, 255500). This is an area to the east of Stratford on Avon District near B4100, which is located to the east of the industrial estate area that may lead to the higher PM_{2.5} concentration.

The Public Health Outcomes Framework data tool⁵ compiled by Public Health England quantifies the mortality burden of PM_{2.5} within England on a county and local authority scale. The 2017 fraction of mortality attributable to PM_{2.5} pollution across England is 5.1%, and in contrast the fraction within Stratford on Avon District Council is slightly lower than the National average at 4.7%.

LAQM.TG(16) Table A.1 Action toolbox presents a list of measures that can be implemented to help reduce concentrations of PM_{2.5}.

Where required Stratford on Avon District Council will review any proposed actions to be implemented with the County Council Public Health team to consider the potential impact of the actions and whether any further action is required.

⁴ Defra Background Mapping data for local authorities (2017-based), available online at <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=20135>

⁵ Public Health Outcomes Framework, Public Health England. data tool available online at <https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/0/qid/1000043/pat/6/par/E12000005/ati/101/are/E07000221>

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

3.1 Summary of Monitoring Undertaken

This section sets out what monitoring has taken place and how it compares with objectives.

3.1.1 Automatic Monitoring Sites

Stratford on Avon District Council does not undertake automatic (continuous) monitoring.

3.1.2 Non-Automatic Monitoring Sites

Stratford on Avon District Council undertook non- automatic (passive) monitoring of NO₂ at 22 sites during 2018. Table A.1 in Appendix A shows the details of the sites.

The changes to the diffusion tube monitoring networks in 2018 are shown as below:

- The Shipston Road location has been relocated from (420683, 254421) to Shipston Road New (420691, 254679);
- Nine new diffusion tubes have been commissioned, four in Studley and five in Stratford upon Avon AQMA to identify any further exceedances; and
- Grove Road 1 ceased monitoring in February 2018 due to its close proximity and consistently similar concentrations to Grove 2.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation” and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

In 2018, there were no monitored exceedances of the annual mean NO₂. There were two diffusion tube locations where the annual mean concentrations were within 10% of the annual mean objective. These two sites were Studley 4 and Birmingham Road 3. Studley 4 is located within the current Studley AQMA and this site has recorded an exceedance, or close to an exceedance, of the annual mean NO₂ AQS objective for the past 5 years. In the last five years, concentrations at this location have been the highest recorded within the monitoring network for the past five years. The diffusion tube at this site is located at the façade of a building where the relevant exposure is located on the first floor. Therefore, no distance correction is required for this location. Currently there are no tool available to estimate the concentrations at different height at the same location.

Birmingham Road 3, within the Stratford-upon-Avon AQMA was commissioned in 2018, this location is not representative of relevant exposure, therefore distance correction is required to predict the annual mean at a point of relevant exposure. The NO₂ fall-off with distance calculator has been used to estimate the annual mean NO₂ concentration at the nearest relevant exposure. Following distance correction, the annual mean NO₂ concentration at a location of relevant exposure was 27.8µg/m³.

Figure A.1, Figure A.2 and Figure A.3 show the trends in annual mean NO₂ concentrations at the monitoring sites over the past five years. It can be seen that there is no visible trend across all monitoring sites between 2017 and 2018 monitored values. Decreases in annual mean concentrations were recorded Greehill Street and Studley 4, whilst the increases in annual mean concentrations were recorded at Guild Street, Wood Street and Henley High Street. The difference of concentrations between 2017 and 2018 concentrations ranged between a maximum increase of 4.1µg/m³ recorded at Henley High Street, and a maximum reduction of 2.3µg/m³ recorded at Studley 4.

During 2018 there were no sites where the NO₂ annual mean was greater than 60µg/m³, therefore in accordance with Defra LAQM.TG(16) there are no sites likely to be at risk of exceeding the 1-hour mean AQS objective.

Appendix A: Monitoring Results

Table A.1 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
Alcester Road	-	Roadside	419014	255202	NO ₂	YES	11	3	NO	2.2
Birmingham Road 1	-	Kerbside	419472	256013	NO ₂	YES	7.5	1	NO	2.2
Birmingham Road 2	-	Roadside	419591	255881	NO ₂	YES	9	2	NO	2.2
Birmingham Road 3	-	Roadside	419816	255601	NO ₂	YES	7	1.5	NO	2.2
Greenhill Street	-	Roadside	419766	255016	NO ₂	YES	0	2.7	NO	2
Grove Rd 1	-	Roadside	419759	254917	NO ₂	YES	0	1.4	NO	2.5
Grove Road 2	-	Roadside	419758	254931	NO ₂	YES	0	1.4	NO	2.5
Guild Street	-	Roadside	420063	255174	NO ₂	YES	0	2.5	NO	2.5
Henley High Street	-	Roadside	415078	265542	NO ₂	NO	0	1.4	NO	2.5
Shipston Road New	-	Roadside	420691	254679	NO ₂	YES	0	9.5	NO	2.2
Stratford Background	-	Roadside	418820	255117	NO ₂	YES	3	2	NO	2.2
Studley 1	-	Roadside	407300	263988	NO ₂	YES	0	2.5	NO	2.5
Studley 2	-	Roadside	407301	263913	NO ₂	YES	0	1.4	NO	2.5
Studley 3	-	Roadside	407292	264027	NO ₂	YES	1	1.4	NO	2.5
Studley 4	-	Roadside	407297	263850	NO ₂	YES	0	1.5	NO	2.5

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Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
Studley 5	-	Roadside	407326	263695	NO ₂	NO	0	3	NO	2
Studley 6	-	Roadside	407231	264034	NO ₂	NO	0	1.8	NO	2.2
Studley 7	-	Roadside	407184	264097	NO ₂	NO	0	1.8	NO	2.2
Studley 8	-	Roadside	407270	264181	NO ₂	NO	0	5.5	NO	2
Studley Background	-	Roadside	407270	263025	NO ₂	NO	5	2.3	NO	2.2
Tiddington Road	-	Roadside	420727	254826	NO ₂	YES	0	1.7	NO	2.2
Wood Street	-	Roadside	420130	254990	NO ₂	YES	0	3.1	NO	2

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2) N/A if not applicable.

Table A.2 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2014	2015	2016	2017	2018
Alcester Road	Roadside	Diffusion Tube	83.3	83.3	-	-	-	-	23.9
Birmingham Road 1	kerbside	Diffusion Tube	100.0	100.0	-	-	-	-	22.2
Birmingham Road 2	Roadside	Diffusion Tube	100.0	100.0	-	-	-	-	30.5
Birmingham Road 3	Roadside	Diffusion Tube	100.0	100.0	-	-	-	-	37.2
Greenhill Street	Roadside	Diffusion Tube	91.7	91.7	33.2	32.2	34.3	33.1	30.2
Grove Rd 1	Roadside	Diffusion Tube	8.3	8.3	31.2	34.7	35.2	33.4	31.7
Grove Road 2	Roadside	Diffusion Tube	91.7	91.7	31.9	35.4	36.1	33.2	33.5
Guild Street	Roadside	Diffusion Tube	100.0	100.0	27.8	30.5	28.3	27.7	29.5
Henley High Street	Roadside	Diffusion Tube	75.0	75.0	31.2	26.2	29.3	26.6	30.7
Shipston Road New	Roadside	Diffusion Tube	83.3	83.3	-	-	-	-	20.9
Stratford Background	Roadside	Diffusion Tube	83.3	83.3	-	-	-	-	12.8
Studley 1	Roadside	Diffusion Tube	100.0	100.0	33.2	32.4	35.19	30.3	31.0
Studley 2	Roadside	Diffusion Tube	83.3	83.3	36.2	33.8	35.56	32.3	32.3
Studley 3	Roadside	Diffusion Tube	100.0	100.0	34.3	27.4	32.4	33.3	33.2

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2014	2015	2016	2017	2018
Studley 4	Roadside	Diffusion Tube	91.7	91.7	39.8	39.5	42.1	40.3	38.0
Studley 5	Roadside	Diffusion Tube	83.3	83.3	25.3	26.9	33.93	30.4	30.4
Studley 6	Roadside	Diffusion Tube	100.0	100.0	-	-	-	-	26.0
Studley 7	Roadside	Diffusion Tube	91.7	91.7	-	-	-	-	25.2
Studley 8	Roadside	Diffusion Tube	100.0	100.0	-	-	-	-	28.5
Studley Background	Roadside	Diffusion Tube	91.7	91.7	-	-	-	-	13.5
Tiddington Road	Roadside	Diffusion Tube	100.0	100.0	35.3	37.7	38.0	34.0	33.7
Wood Street	Roadside	Diffusion Tube	91.7	91.7	32.6	32.5	36.2	30.5	31.6

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.1 – Trends in Annual Mean NO₂ Concentrations: Stratford Upon Avon

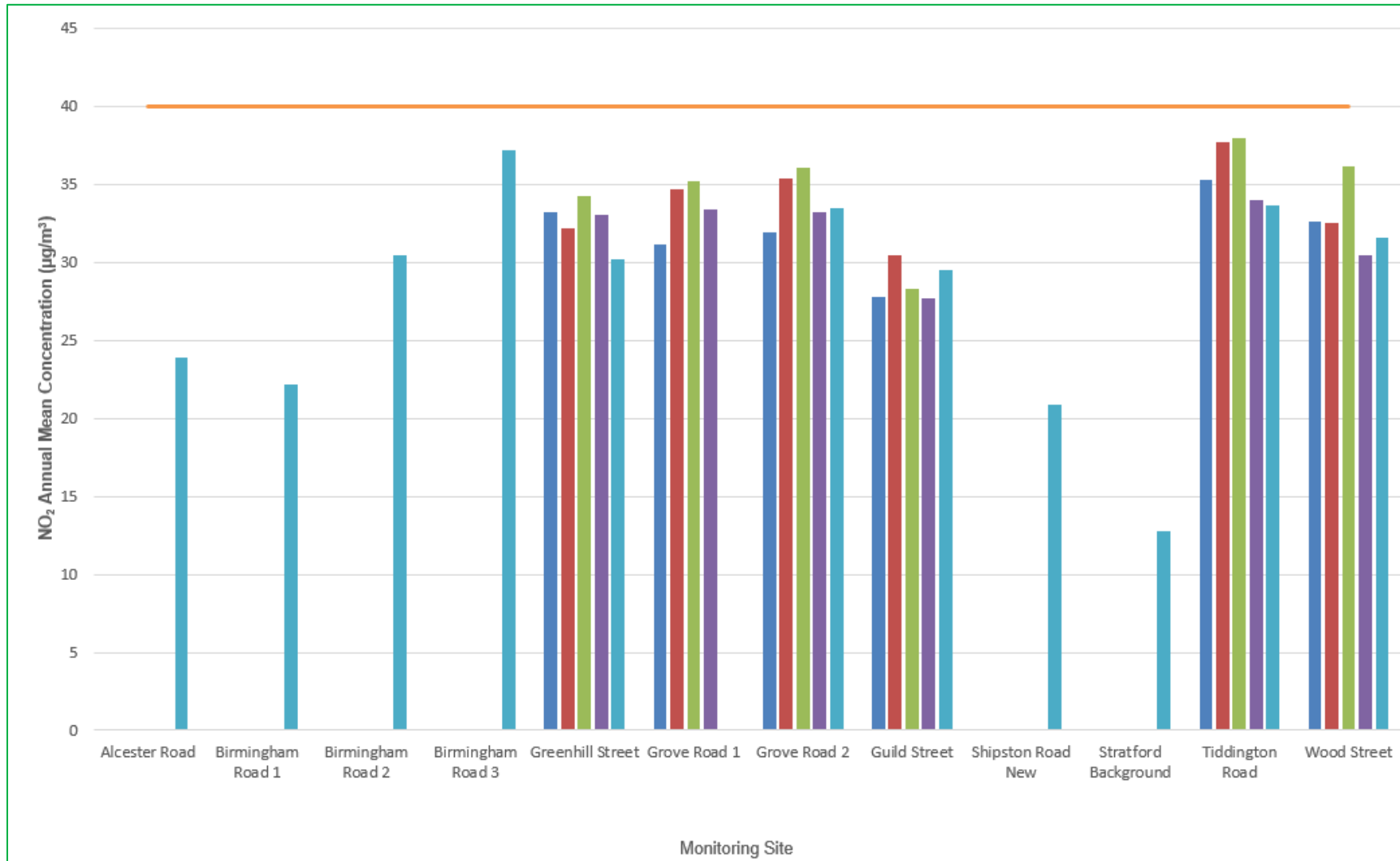


Figure A.2 – Trends in Annual Mean NO₂ Concentrations: Studley

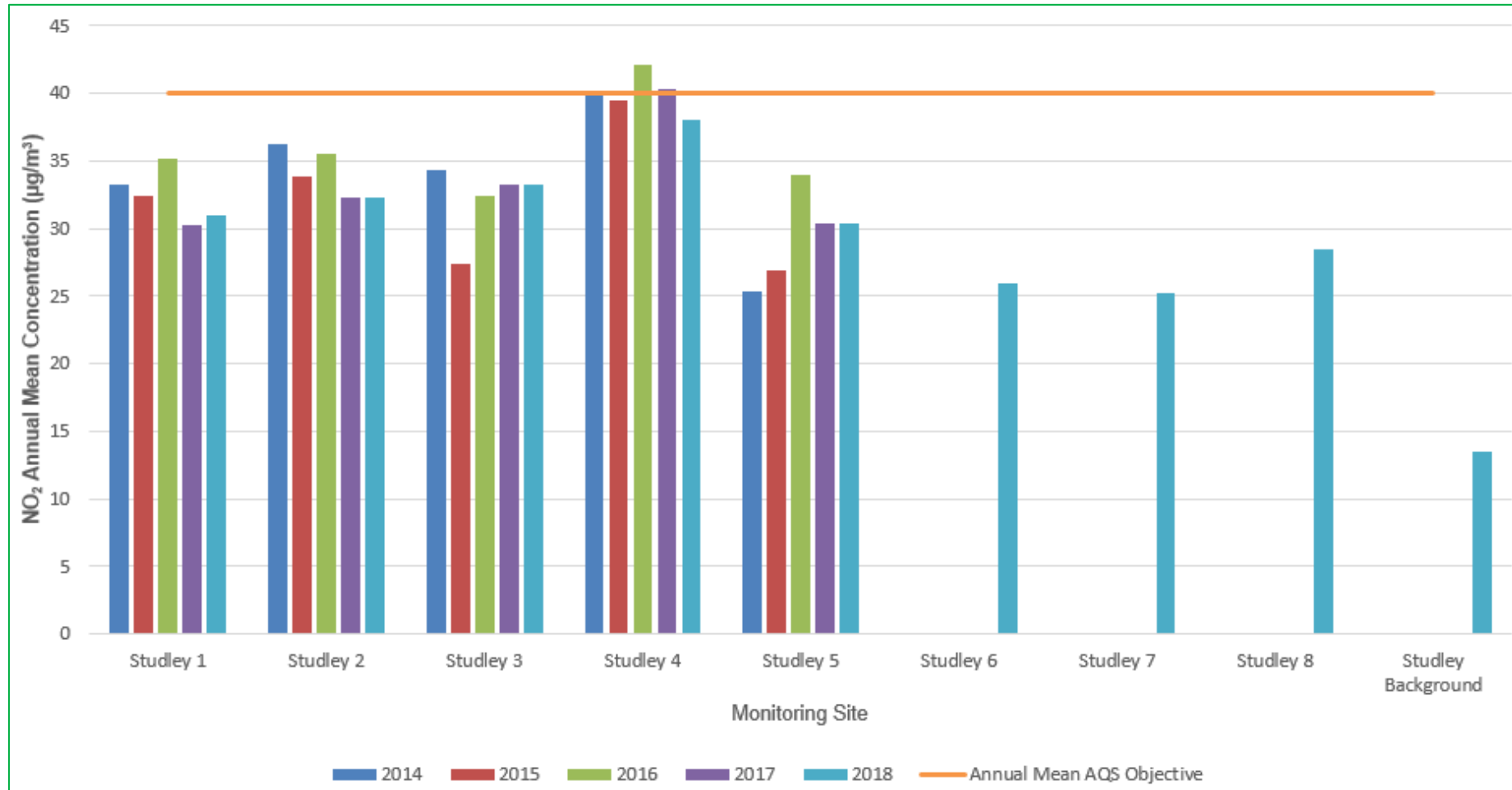
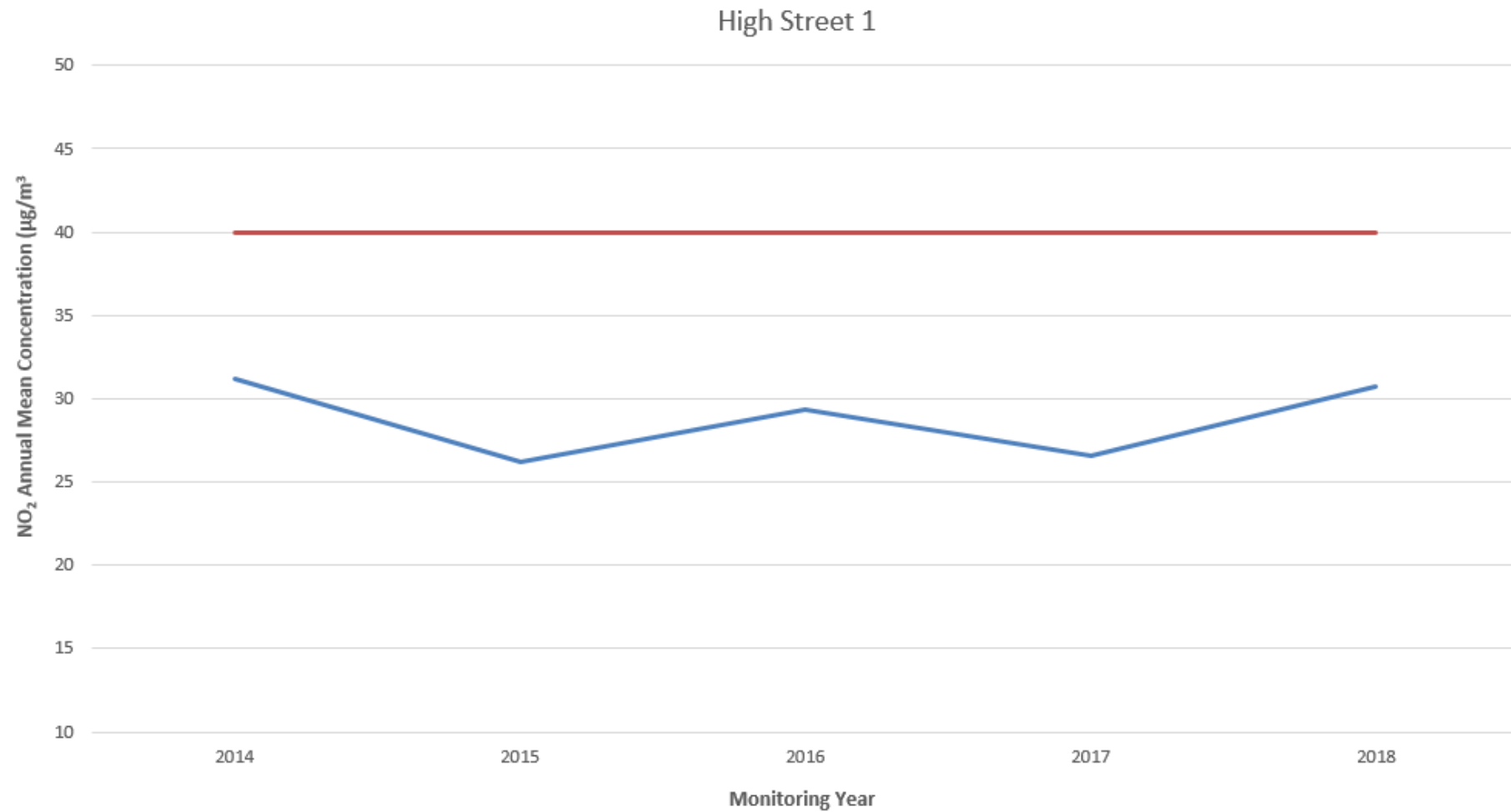


Figure A.3 – Trends in Annual Mean NO₂ Concentrations: Henley in Arden



Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2018

Site ID	NO ₂ Mean Concentrations (µg/m ³)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.93) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
Alcester Road	21.8	29.0	27.2	-	-	22.4	31.3	9.2	27.1	30.2	27.4	31.0	25.7	23.9	-
Birmingham Road 1	21.3	28.5	23.2	25.2	27.9	15.2	18.3	26.5	21.0	25.9	25.6	27.3	23.8	22.2	-
Birmingham Road 2	31.0	38.0	32.4	35.8	35.9	21.3	38.2	29.4	32.7	34.7	30.9	33.5	32.8	30.5	-
Birmingham Road 3	35.4	44.0	34.7	45.4	48.3	34.2	50.5	22.7	37.8	46.5	40.0	40.1	40.0	37.2	27.8
Greenhill Street	32.8	-	30.8	33.4	32.3	24.5	36.7	30.3	32.5	32.4	34.9	36.4	32.4	30.2	-
Grove Rd 1	34.1	-	-	-	-	-	-	-	-	-	-	-	34.1	31.7	-
Grove Road 2	39.0	38.6	-	37.0	27.3	26.1	40.5	31.6	37.3	42.9	35.7	40.0	36.0	33.5	-
Guild Street	27.9	32.8	29.3	34.3	34.2	27.6	33.7	25.0	29.3	39.6	33.3	33.6	31.7	29.5	-
Henley High Street	31.6	34.0	30.0	34.3	-	35.3	-	-	30.0	34.6	35.9	31.4	33.0	30.7	-
Shipston Road New	-	26.4	20.6	24.3	20.7	18.9	24.6	20.6	23.5	-	20.4	24.8	22.5	20.9	-
Stratford Background	-	-	18.3	12.5	10.4	6.4	9.3	17.6	10.2	15.6	18.1	18.6	13.7	12.8	-
Studley 1	28.4	29.9	30.0	37.1	40.1	32.9	39.6	29.2	28.0	39.9	34.2	30.2	33.3	31.0	-

Site ID	NO ₂ Mean Concentrations (µg/m ³)												Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.93) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
Studley 2	-	-	34.2	38.1	42.2	28.1	35.8	27.1	28.7	39.0	37.7	36.6	34.7	32.3	-
Studley 3	37.9	28.0	34.1	35.3	37.8	35.5	49.2	31.9	31.8	38.5	32.9	35.4	35.7	33.2	-
Studley 4	35.1	42.1	38.6	41.2	50.2	42.0	0.6*	31.7	36.6	46.6	45.5	39.4	40.8	38.0	-
Studley 5	32.0	34.1	5.3*	34.3	37.4	33.5	36.0	24.4	26.1	36.2	8.3*	33.1	32.7	30.4	-
Studley 6	27.4	30.3	25.5	28.8	29.5	22.8	30.6	24.3	26.2	32.1	28.2	30.1	28.0	26.0	-
Studley 7	22.7	30.0	31.5	25.3	29.8	25.3	26.4	18.3	-	31.0	30.1	28.0	27.1	25.2	-
Studley 8	32.2	30.8	27.2	33.1	32.8	28.1	32.9	21.8	25.4	34.5	33.5	35.3	30.6	28.5	-
Studley Background	16.9	20.0	18.5	12.4	12.7	10.3	11.8	11.0	11.0	16.9	49.1*	18.3	14.5	13.5	-
Tiddington Road	32.5	38.5	34.4	36.6	42.3	32.4	40.8	33.2	36.0	36.0	39.9	32.5	36.3	33.7	-
Wood Street	31.5	35.2	32.6	34.2	38.2	38.5	34.9	26.6	-	37.4	29.2	35.8	34.0	31.6	-

*The results were discarded.

Studley 4: Result for the July tube was below the reporting limit.

Studley 5: March result was compromised due to the diffusion tube containing water droplets. November tube result was far below the concentrations recorded for the rest of 2018, so it has been removed, thus adopting a conservative approach to avoid the results being skewed downwards.

Studley background: November result was compromised due to the tube being returned dirty.

Note: Distance correction has only been completed for the monitoring locations that are not representative of exposure with the annual mean concentrations were above 36µg/m³.

- Local bias adjustment factor used
- National bias adjustment factor used (

- Annualisation has been conducted where data capture is <75%
- Where applicable, data has been distance corrected for relevant exposure

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

Diffusion Tube National Bias Adjustment Factors

The diffusion tubes for the year 2018 were supplied and analysed by Gradko International Limited, the tubes were prepared using the 20% Triethanolamine (TEA) in water preparation method. The national bias adjustment factor for Gradko 20% TEA in water is 0.93 (based on 30 studies, version 03/19) as derived from the national bias adjustment calculator⁶.

Discussion of Choice of Factor to Use

The diffusion tube data has been corrected using a bias adjustment factor, which is an estimate of the difference between diffusion tube concentration and continuous monitoring, the latter assumed to be a more accurate method of monitoring. LAQM.TG(16) provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

With regard to the application of a bias adjustment factor for diffusion tubes, the Defra Technical Guidance LAQM.TG(16) and the LAQM Helpdesk⁷ recommend the use of a local bias adjustment factor where available and relevant to diffusion tube sites. There is no co-location study locally; therefore, the national bias adjustment of 0.93 is used to correct diffusion tube monitoring.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes for 2018 were supplied and analysed by Gradko using the 20% TEA in water preparation method. All results have been bias adjusted where required before being presented in Table B.1. Gradko is a UKAS accredited laboratory and participates in the new AIR-PT Scheme (a continuation of the Workplace Analysis

⁶ National Diffusion Tube Bias Adjustment Factor Spreadsheet version 03/19 available at <https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

⁷ [Laqm.defra.gov.uk](https://laqm.defra.gov.uk)

Scheme for Proficiency (WASP)) for NO₂ tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO₂ concentrations reported are of a high calibre. The lab follows the procedures set out in the Harmonisation Practical Guidance In the latest available AIR-PT results, AIR-PT AR 0024 (January to February 2018), AIR-PT AR025 (April to May 2018), AIR-PT AR027 (July to August 2018), AIR-PT AR028 (September to October 2018) and AIR-PT AR030 (January to February 2019). Gradko has scored 100% on all results in 2018. The percentage score reflects the results deemed to be satisfactory based upon the z-score of < ± 2. All local Authority co-location studies in 2018 were rated as ‘good’ (tubes are considered to have "good" precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%).

Distance from Road Correction

In line with LAQM.TG(16) distance correction has been applied to NO₂ monitoring sites that have recorded an annual mean concentration above or within 10% of the annual mean objective. There are no exceedances of annual mean NO₂ AQS objective, and there are only two diffusion tube sites Birmingham Road 3 and Studley 4 within the NO₂ monitoring network that was within 10% of the NO₂ annual mean objective in 2018, Studley 4 is located at the relevant exposure but Birmingham Road 3 is not at the location representative of relevant exposure.

The NO₂ Fall-Off with Distance Calculator (v4.2) has been used to derive the NO₂ concentration at a location of relevant exposure for Birmingham Road 3; the results of the calculations are presented in Table C.1.

Table C.1– NO₂ Fall-Off With Distance Calculations

Site ID	Distance (m)		NO ₂ Annual Mean Concentration (µg/m ³)		
	Monitoring Site to Kerb	Receptor to Kerb	Background ⁸	Monitoring to Site	Predicted at Receptor
Birmingham Road 3	1.5	8.5	12.4	37.2	27.8

⁸ <https://uk-air.defra.gov.uk/data/laqm-background-home>

New Sources of Pollution

Southam Road Stoneythorpe

The development will comprise up to 700 dwellings; 99 extra-care units (Use Class C2); 80-bed Care Home with Dementia unit (Use Class C2); one-form entry Primary School with associated open space; local centre comprising 240sq.m floorspace (Use Class A1, A2, A3 and A5), 370m² neighbourhood store, 240sm² office space (Use Class B1) and 100-bed hotel (Use Class C1). The air quality assessment considered the impact upon Southam and it was concluded that there would be no adverse effect.

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – NO₂ Diffusion Tube Locations: Stratford on Avon AQMA

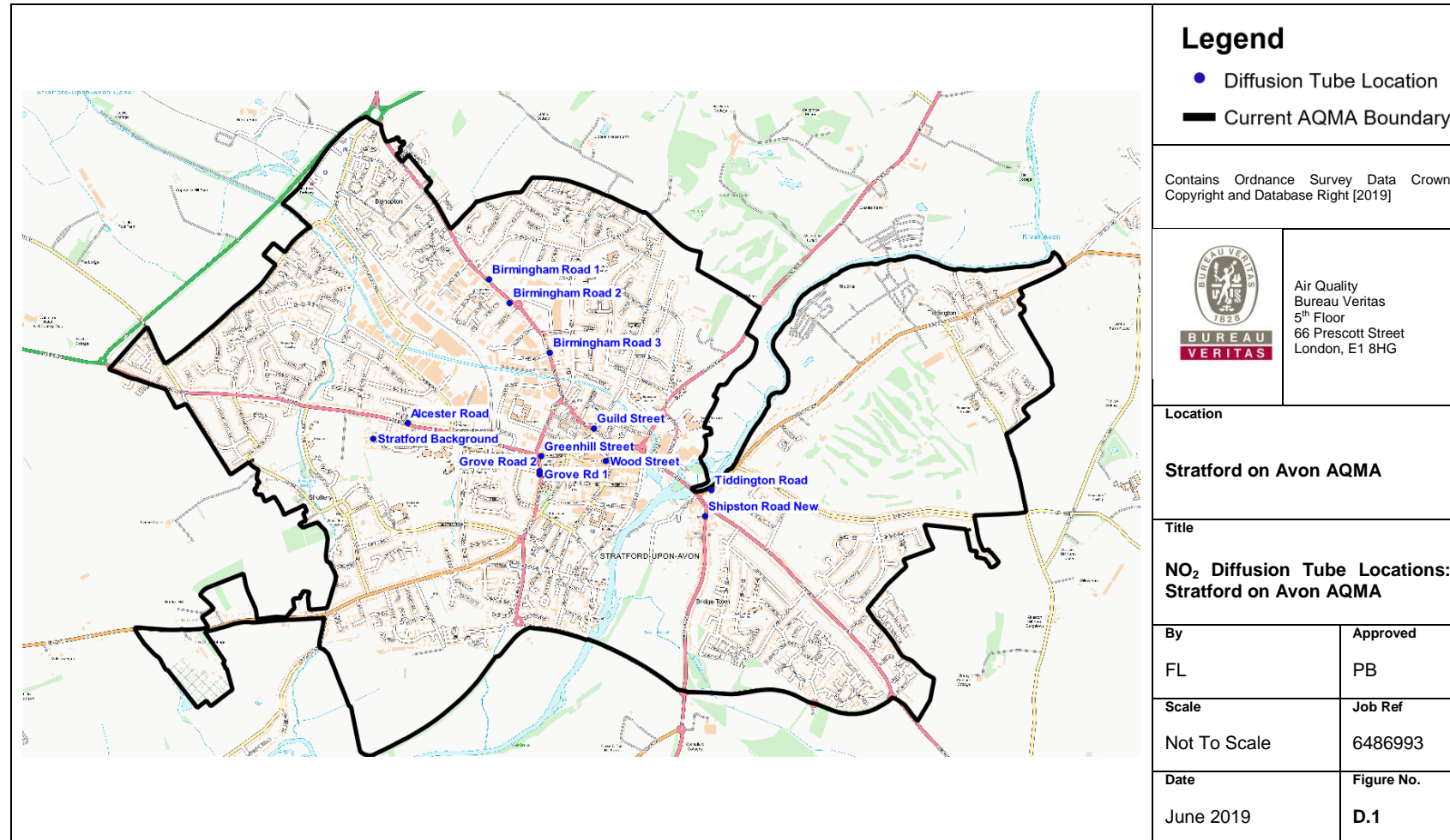


Figure D.2 – NO₂ Diffusion Tube Locations: Studley 1

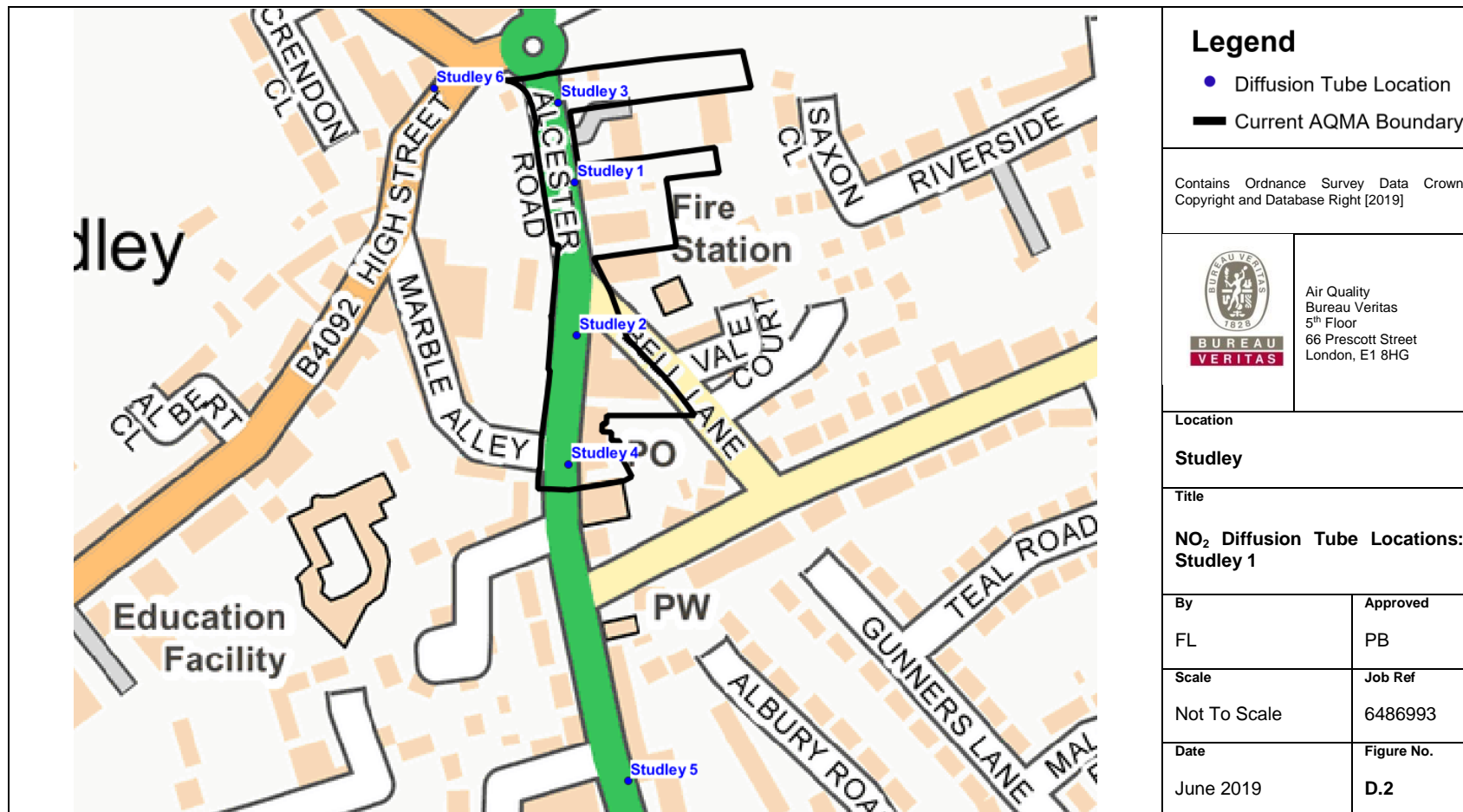


Figure D.3 – NO₂ Diffusion Tube Locations: Studley 2

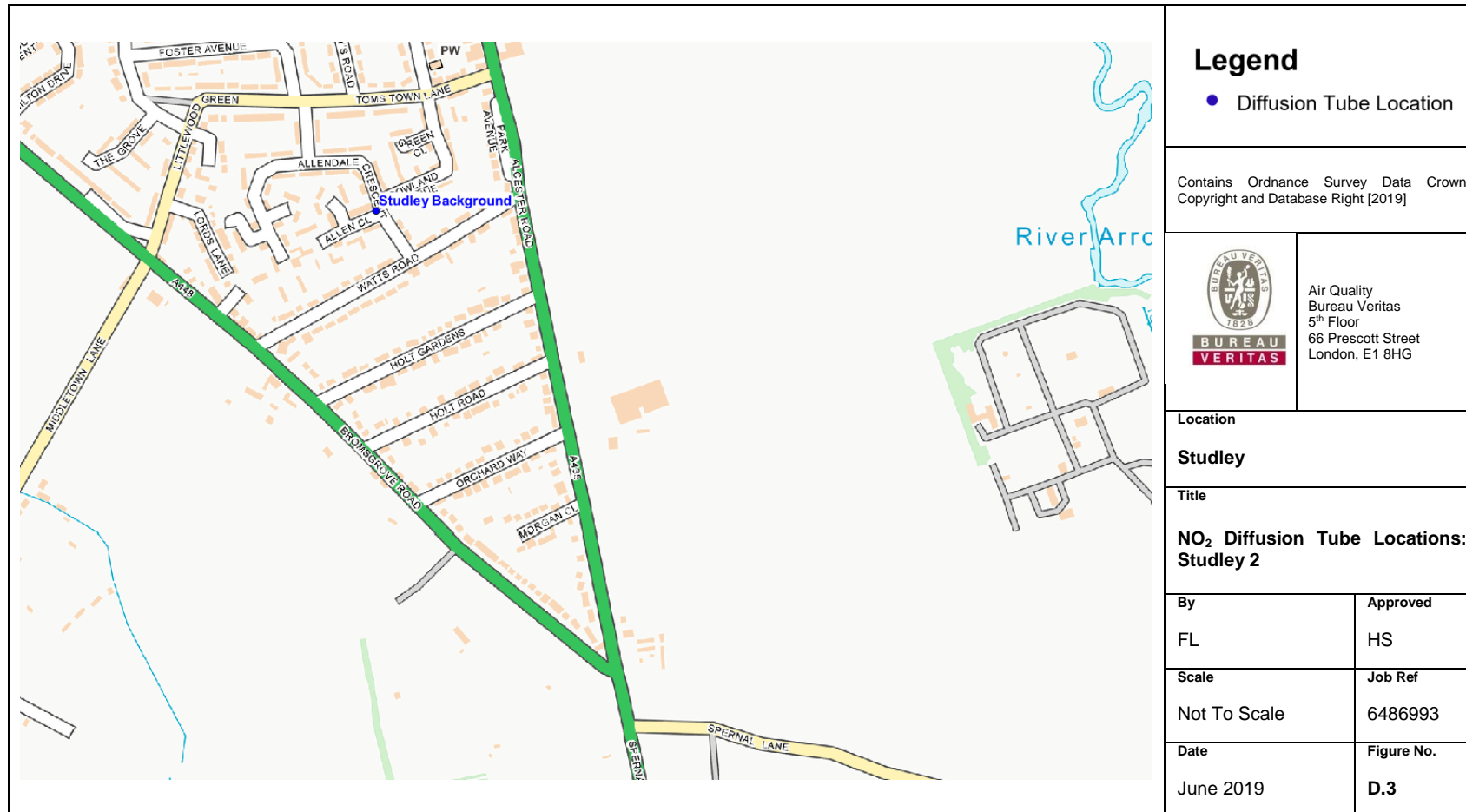


Figure D.4 – NO₂ Diffusion Tube Locations: Studley 3

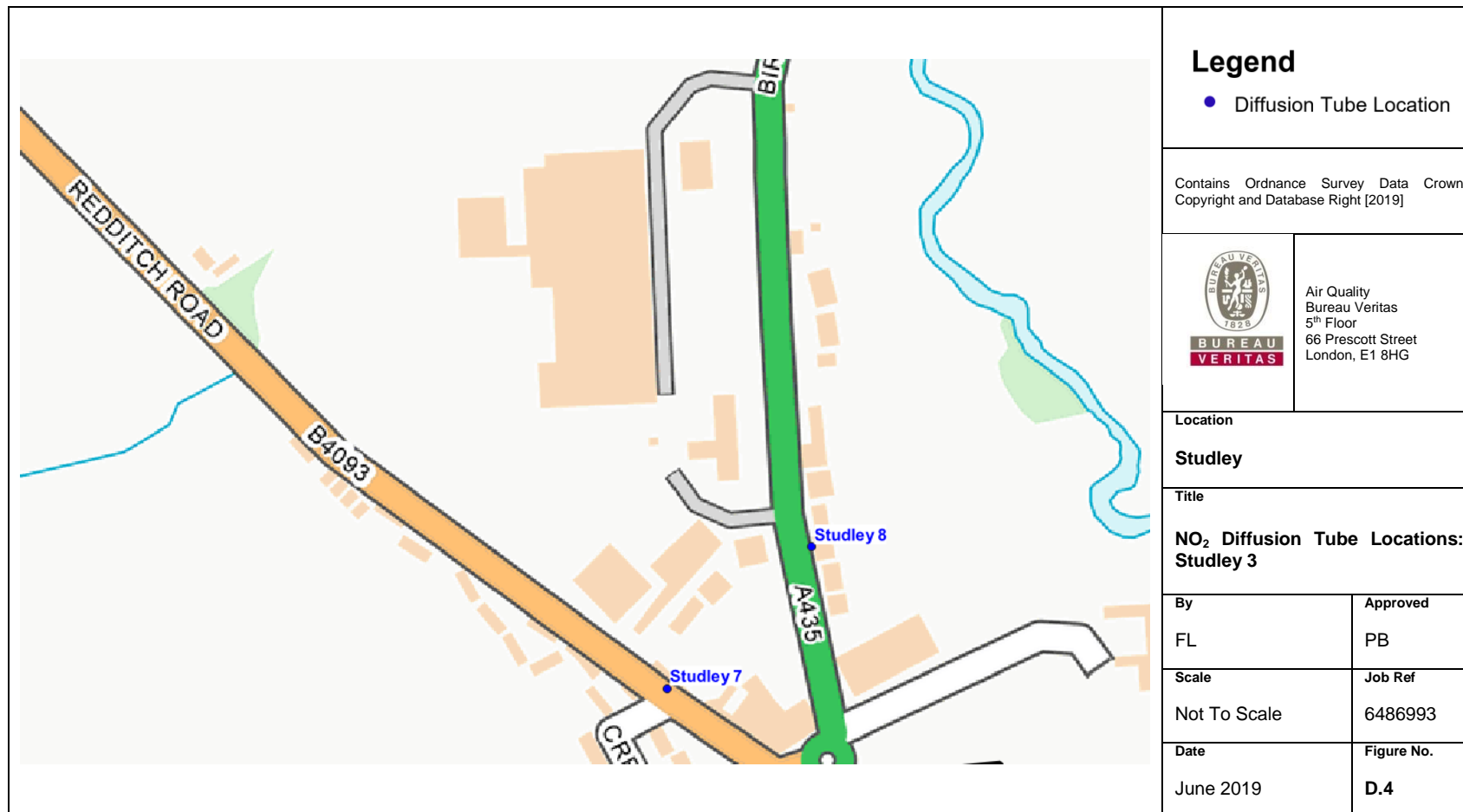
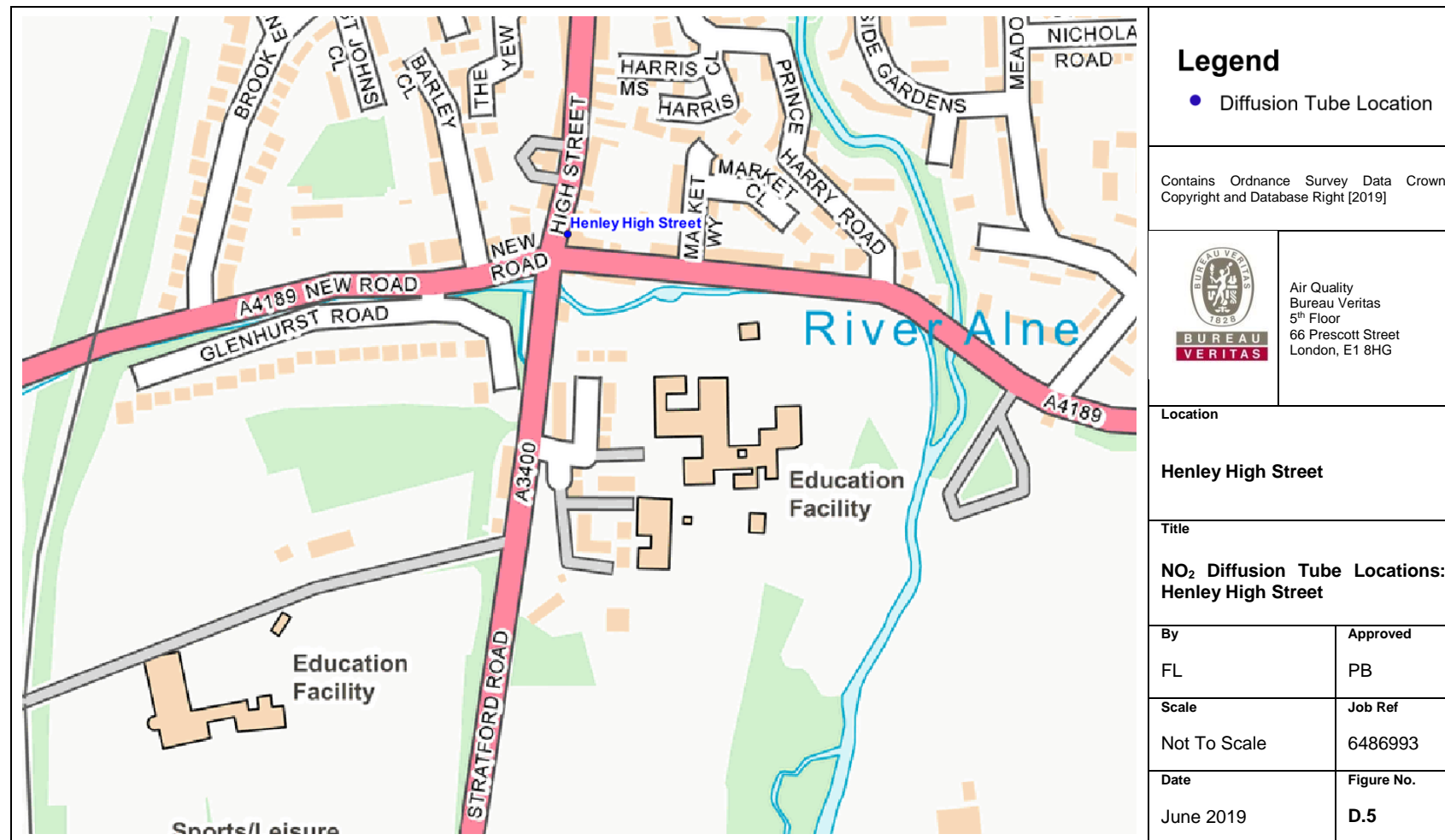


Figure D.5 – NO₂ Diffusion Tube Locations: Henley High Street



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁹	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

⁹ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG(16). February 2018. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG(16). May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Stratford on Avon District Council, 2008 Air Quality Action Plan.
- Stratford on Avon District Council 2018 Annual Status Report.
- Stratford on Avon District Council 2017 Annual Status Report.
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/19 V1 published in March 2019.